two terms œcology and biology (pp. 4 and 57), which, though synonyms in German, are far from equivalents in English. The choice of the form for proper names, if not of great importance, would lead in English rather to Vesalius than Vesal (p. 12), a matter in which the reader is given his choice with Galen and Galenius (p. 12). In discussing animal temperature poikilothermous, idiothermous and homoiothermous are used without good reason, so far as we know, for the more usual pœcilothermal, idiothermal, and homothermal. The fact that the volume in its several editions has passed from one century to another has led to some confusion which should have been cleared up in editing; thus while we are correctly told (p. 17) that the cell theory is of the "last century" and that the name Protozoa was given "in the century just closed" (p. 186), the "*Origin of Species*" is described (p. 24) as a "scientific work of this century." The proofreading has been unusually close; on page 13, line 28, *unbiassed* is preceded by a useless dash and on page 435 Cumbarus stands for Cambarus. The presswork and illustrations are as a rule good, though many of the newly introduced, original figures, particularly the half-tones, are too faintly printed. The defects that have been pointed out are insignificant compared with the good qualities of the volume, which deserves immediate acceptance as the best general text-book of zoölogy for the majority of American colleges.

The Neurone Theory and its Adherents.[1] — Since the promulgation of the doctrine of the neurone by Waldeyer in 1891 numerous general estimates of this theory have been advanced by almost all the more noted workers in neurology. These expressions of opinion have almost invariably come from advocates of the theory and have been the means of introducing at most only slight modifications of the general doctrine. Up to the present no single considerable publication has been devoted to a thorough review of the body of evidence brought forward by the neuronists and to a radical and well directed attack on their position. Nissl's *Neuronenlehre* is such a publication.

The first chapter of this work takes up briefly Waldeyer's original conception of the neurone and the modifications that during the last ten years this has undergone. In deciding what the essentials of the neurone theory are Nissl makes one of the clearest and most

[1] Nissl, F. *Die Neuronenlehre und ihre Anhänger. Ein Beitrag zur Lösung des Problems der Berziehungen zwischen Nervenzellen, Faser und Grau.* Jena, Fischer, 1903, 8vo., vi + 478 pp., 2 Taf.

justifiable statements of the subject that has appeared. The neurone theory is in essence the application of the cell theory to the complete interpretation of nervous structures, in that the nerve fibres and the neuropile are to be regarded as outgrowths and integral parts of nervous cells whose bodies are represented by ganglion cells. Thus the question of contact or continuity among neurones is set aside as secondary and the real core of the matter is reached by the declaration just given.

Following the introductory chapter come eleven others devoted each to the exposition and rigorous criticism of the views of some well-known neurologist; among the investigators whose opinions are here analyzed are Edinger, Hoche, von Lenhossék, Van Gehuchten, Ramón y Cajal, Kölliker, Verworn, and His. The line of criticism which pervades this part of the book consists in pointing out the fallaciousness of the Golgi method and the failure on the part of the neuronists to appreciate the full significance of the neuropile. The Golgi method is notorious for incompleteness in its impregnations and yet observations based upon it have been used again and again in support of the idea that the neuropile is at least physiologically separable into discrete portions referable to given neurones. Since we know so very little about the structure of the neuropile it would seem, as Nissl rightly urges, that to pass it over simply as a terminal outgrowth of the neurone, or to ignore it almost entirely, as Verworn does, is wholly unjustifiable. This treatment is all the more reprehensible because there is good reason to believe that the neuropile may be the most important physiological element in the whole nervous mechanism.

The concluding chapters, eight in number, serve to develop Nissl's own views as to the structure of the nervous system. These are based largely upon the work of Apáthy and Bethe and centre chiefly about the neuropile. The fibrillar network of the central gray, the invasion of ganglion cells by the neurofibrillæ, and the relation of these to the pericellular Golgi network are discussed in much detail. The scheme of nervous mechanism that Nissl constructs from recorded facts is certainly in many particulars inconsistent with the neurone doctrine. This doctrine was a happy suggestion as to the relations of cells and fibres, but subsequent work on the nervous system has shown that these elements are quite secondary and that the real nervous material is the neurofibrillæ. Since the neurone theory does not touch these and since we know so little about their anatomy and nothing whatever about their development, speculation

should be abandoned together with the insufficient neurone theory, and facts concerning the neurofibrillæ should be sought. This in general is Nissl's position and it will probably carry to the mind of the neuronist the conviction that if this is a fair example of what the neurone theory will have to meet, that theory is still very safe.

Notes. — The earliest stages in the development of the teeth in selachians have been investigated by Laaser (*Jena. Zeitschr. f. Naturwissench*, Bd. 37, pp. 551–578), who finds that in embryos of Spinax, Acanthias, and Mustelus of three to four centimetres in length, a dental ridge is formed by a thickening of the epithelium of the jaws. The ridges are formed earlier in the lower jaws of Spinax and Acanthias and in the upper jaw of Mustelus. Teeth develop not only in the dental ridges but also in the adjacent epithelium where in their early stages they are indistinguishable from placoid scales. The first hard part formed is the dentine, the enamel being entirely absent at these early stages.

Professor Bastian (London, Williams & Margate. Pt. II. 1902, pp. 63–147, pls.) presents in a second installment much additional evidence in favor of his views on heterogenesis. Thus he believes he has shown that vorticellae may be produced from a pellicle largely composed of spirilla, that amoebae may be made to segment and their parts be converted into ciliate infusoria, that the entire egg of the rotifer Hydatina can be transformed into a ciliate infusorian Otostoma, etc. The paper is illustrated by photographic reproductions but even these cannot shake the conviction of many zoölogists, that because of the methods used something is probably wrong with the observations recorded in the text.

Dr. J. Anglas has published as number 17 of the biological series of "*Scientia*" a clear account of the changes undergone by the tissues during the internal metamorphosis of insects. The histogenesis of early development is first taken up, then the process of histolysis, and finally the reconstructive processes. The book contains a final chapter on the causes of internal metamorphosis.

The origin and classification of leucocytes and a very readable discussion of the theories of their relations to health and disease have been published in the biological series of "*Scientia*" numbers 15 and 16 by Dr. J. Levaditi.

Fischer (*Jena. Zeitschr. f. Natur wissensch*, Bd. 37, pp. 691–726) has